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Exploring China's success at the Olympic Games: A competitive advantage approach

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Abstract

Research question: Much research has been carried out to analyse factors contributing to China's notable success at the Olympic Games over the past decade. However, research which examines China's deliberate Olympic medal strategy remains relatively uncharted territory. Thus this paper seeks to address this gap and examines how China has become one of the most successful superpowers at the Summer Olympic Games within the last two decades by virtue of the application of the competitive advantage framework.

Research methods: Seven semi-structured interviews were conducted with key stakeholders of elite sport in China. These data were supplemented by a range of official publications of sports governing bodies in China, their websites and related information from the websites of influential media.

Results and findings: It is evidenced that China's current Olympic configuration and (gold) medal distribution among sports/disciplines are largely underpinned by Tian Maijiu's research on cluster-based sports training and the 'Five-Word principle' (i.e. Small, Fast, Women, Water and Agile). In addition, there is clear evidence of China's continuous expansion of its market and the ambition to greater success in gold-medal abundant and collective ball sports/disciplines.

Implications: This article concludes by critically examining the key characteristics and outcomes of China's approach to clustering and prioritisation, attempting to provide some insights into the establishment or refinement of Olympic (gold) medal strategy for other nations, where China may provide some useful lessons. The compatibility of the competitive advantage framework with the analysis of China's Olympic success is also discussed.

Keywords: Elite sport, China, Olympic strategy, priority sports, competitive advantage

Introduction

The Summer Olympic Games is the most influential sports event worldwide, the significance of which has transcended sport (De Bosscher, Bingham, Shibli, Van Bottenburg, & De Knop, 2008) by having a direct or indirect effect on political (see, for example, Bridges, 2008; Preuss & Alfs, 2011), economic (see, for example, Duran, 2002; Fourie & Santana-Gallego, 2011; Kasimati & Dawson, 2009), social (see for example, Toohey & Veal, 2007; Waitt, 2003; Zhou & Ap, 2009) and urban (see for example, Davis & Thornley, 2010; Essex & Chalkley, 1998) areas. As a corollary, there has been a burgeoning of government interest in pursuing Olympic success, through elite sport development since the mid-1960s at least (Green & Houlihan, 2005).

Among these nations, China is a notable exemplar. With the rationales of establishing national pride and identity, international prestige and outmanoeuvring rivals (Xiong & Zheng, 2007), the total amount of investment in China's elite sport increased from 52.66 billion RMB (equivalent to \$8.49 billion) in 2008, which accounted for 15.83% of the overall financial input in Chinese sports industry, to 73.38 billion RMB (equivalent to \$11.82 billion, 20.09%) in 2011 (Zhu, 2015). China's performance at the Olympics in the last decade has also been rather extraordinary: having won its first Olympic gold medal at the 1984 Los Angeles Olympic Games, China reached the top of the gold medal table at the Beijing 2008 Games. A closer examination of the medal table reveals that six particular sports/disciplines, that is, table tennis, diving, artistic gymnastics, weightlifting, shooting and badminton, have been the primary sources of gold medals at the Olympics in which China has competed (1984-2012). In fact, the reliance on a very limited number of sports/disciplines for the majority of Olympic (gold) medals or even all Olympic medals is also evident in a wide range of nations (see Table 1), ranging from superpowers such as the USA, major powers such as the UK¹,

¹ The UK's performance at the 2008 Beijing and 2012 London Olympic Games was very impressive. Yet, this article is based on countries' performance between Barcelona 1992 and London 2012 and only four nations (the USA, China, Russia and Germany) which have won at least a total of 100 gold medals during this period are considered as superpowers.

Cuba, South Korea, Romania and Japan, to most medium powers² (most notably Slovakia, Jamaica, Kenya, Iran and North Korea) and the vast majority of below-medium powers. Indeed, 'the global sporting arms race' (De Bosscher et al., 2008; Oakley & Green, 2001) has resulted in an increasingly prominent degree of (gold) medal concentration and specialisation. The search for competitive advantage has become one of the most salient characteristics of contemporary Olympic Games (Houlihan & Zheng, 2013).

Table 1. Examples of priority sports/disciplines of some nations.

Nation	Priority Sports/Disciplines
China	Diving, Weightlifting, Artistic Gymnastics, Table Tennis, Shooting, Badminton, Women's Judo
UK	Rowing, Cycling, Athletics, Sailing, Swimming
Australia	Swimming, Rowing, Cycling, Athletics, Hockey, Basketball, Sailing
Romania	Artistic Gymnastics, Rowing, Fencing
New Zealand	Equestrian, Rowing, Sailing, Rugby, Golf, Cricket, Netball
Jamaica	Football, Cricket, Athletics, Netball
Bulgaria	Athletics, Artistic Gymnastics, Swimming, Wrestling, Boxing, Weightlifting, Rhythmic Gymnastics, Rowing
Hong Kong	Table Tennis, Sailing (Windsurfing), Cycling, Badminton
Singapore	Table Tennis, Sailing, Athletics, Badminton, Bowling, Football, Swimming & Water Polo
Zambia	Football, Athletics, Boxing

Note: For some nations, the prioritisation of certain sports/disciplines has been explicitly identified while for some others, the prioritised position of some sports is evidenced most notably in funding allocation.

Sources: Banda (2010); Girginov (2009); Hong Kong Sports Institute (2010, 2011, 2012); Liang et al. (2006); Ministry of Community Development of Singapore (1993); Petracovschi & Terret (2013); Piggin (2010); Stewart (2011); Toomer (2014); UK Sport (2015a, 2015b); Zheng (2015, p. 9).

In comparison to the increasing amount of research focused on elite sport in general, there are very few empirical investigations into the rationales of and

² According to Houlihan and Zheng (2013, p. 346), medium sports powers are countries that won at least two gold medals at a single Olympic Games at least twice between 1992 and 2012.

the approaches used for establishing such specialisation and concentration. In particular, research which examines China's deliberate Olympic medal strategy remains relatively uncharted territory. Thus this paper seeks to address these research gaps, and examines how China has become one of the most successful superpowers at the Summer Olympic Games within the last two decades from the perspective of Olympic strategy.

The paper begins with a brief introduction of the competitive advantage theory (Porter, 1990) and its key concept – clustering theory. It then articulates how the competitive advantage framework and clustering theory are in line with the two principles which played key roles in enhancing China's elite performance at the Olympics. A document analysis of the government policy, official annual reports and media resources, and a total of seven interviews with political leaders, officials, coaches and judges ³ are used to enhance our understanding of the process of China's establishment of its competitive advantage and deliberate adoption of the cluster theory. Based on an analysis of China's elite performance at the Olympics, the article then synthesises the impact of these two principles, and summarises their implications for the formation and development of distinctive characteristics of elite sport at the Olympic Games. Finally, the conclusion provides a brief summary of the findings, attempting to yield some fundamental insights into how to achieve elite success more broadly and Olympic medal success in particular, and to provide some useful experience for key decision makers in other nations.

Porter's competitive advantage and cluster theory

While there has been some previous work in the literature investigating the elite sport system, for example, the Sports Policy Factors Leading to International Sporting Success (SPLISS) model (De Bosscher, De Knop, Van Bottenburg, & Shibli, 2006) which has sought to explain the factors contributing to international sporting success, it proved to afford only a partial

³ The status of the interviewees was combined in many cases. For example, the coach of the National Cycling Team interviewed was also an official of the National Cycling and Fencing Management Centre and this also applied to the case of the National Swimming Team.

view for China. As pointed out by Henry and Ko (2015), the SPLISS model is less capable of offering context-specific explanations of policy outcomes in an investigated country, and fails to measure what is actually done within the policy system (referred to as the 'Black Box' issue). Thus it is not able to fully unveil the characteristics of the elite sport system and its development in China, as it fails to acknowledge the impact and key roles of Tian's (1998) cluster-based sports training theory and the 'Five-Word principle' (which will be addressed in more detail below).

In comparison, mainstream management theory offers some important insights and serves as a promising way to organise the discussion of the competitive success of China's elite performance at the Olympics. Derived from the field of strategic management, competitive advantage (Porter, 1990) not only provides a theoretical strand for understanding why China succeeds at the Olympic Games, but also offers a framework for the analysis of the determinants of China's advantages on the Olympic stage. It is noteworthy that it is not Porter's whole 'Diamond Model' (which identifies four determinants of national advantage: i.e. *factor conditions*, *demand conditions*, *related and supporting industries*, and *strategy, structure and rivalry*) that will be adopted in this paper, as some of the factors are considered not directly relevant to the field of sport policy (Porter's competitive advantage framework was established on the ground of international economics); instead, it is the key concepts in relation to strategic management (e.g. the concept of clusters, factor conditions, strategy, structure and rivalry, competence, and the role of government) that are pertinent to the central research questions of this article and thus applied.

The application of the principles of competitive advantage is well evidenced in the literature in strategic management (Barney, 2001, 2007; Burden & Proctor, 2000; Fahy, 2000; Fahy, Farrelly, & Quester, 2004; Liao & Hu, 2007; Lin, 2003; Ma, 2004) and international economics (Clulow, Gerstman, & Barry, 2003; Peteraf, 1993; Porter, 2008). On application of the competitive advantage theory in strategic management, among the three general approaches (Hafeez, Zhang, & Malak, 2002): *resource-based view*,

competence-based perspective, and *dynamic capabilities approach*, the competence-based competitive advantage (see for example, Jüttner & Wehrli, 1994; Qu, Pan, & Mao, 1993) resonates strongly with this study. The competence-based perspective suggests that, in order to gain competitive advantage, an organisation or a nation must develop and protect *competences* which stem from the integration of *assets* and *capabilities* (Hafeez et al., 2002). As summarised by Hafeez et al. (2002), in comparison with the resource-based view, this approach places emphasis on the development of the appropriate competencies for long-term success, and takes into account the changes of external environment. It also recognises the link between *strategy* (in this case both national and regional elite sport strategies), the organisational *resources* (including physical, intellectual and cultural assets) and *capabilities* (referring to the capacity for a team of resources to perform some tasks) (Hafeez et al., 2002). These unique capabilities and resources are referred to as core competencies which are 'valuable capabilities those are collective and unique in their characteristics, as well as strategically flexible contributing toward the success of potential business' (Hafeez et al., 2002, p. 34). The core competencies of an organisation or a nation are virtually the source of sustainable competitive advantages (Prahalad & Hamel, 1990).

One of the most important concepts within competitive advantage theory is *clusters* (Teece, Pisano, & Shuen, 1997). Introduced by Porter (1998, p. 78), clusters originally referred to the geographic concentration of 'critical masses of unusual competitive success in particular field'. In economic terms, being part of a cluster enables firms to operate productively in sourcing inputs, accessing information, and technology, and coordinating with related firms. Forming clustering can also drive innovation and stimulate the formation of new businesses. In this paper, clusters represent a form of cooperation between sports/disciplines which are similar and possibly strategically linked. This theory sits in alignment with two of the most fundamental principles that have shaped the elite sport landscape and Olympic strategy in China, that is, 'cluster-based sports training' (Tian, 1998) and the 'Five-Word principle'. Thus

the following discussion aims to identify how the clustering approach is associated with Tian's theory and the 'Five-Word principle'.

Competitive advantage associated with 'Five-Word principle' and the clustering approach associated with Tian's training theories

As suggested by Porter (1990), nations are most likely to succeed in industries (referring to particular Olympic sports/disciplines in our case) where the *determinants* of national competitive advantage are the most favourable. *Factor conditions*, as one of the four factors within Porter's Diamond Model, are pertinent to the identification of the *determinants*. Porter (1990, p. 74) argued that each nation possesses 'factors of production' (as part of the 'core competence') which include a wide range of inputs, for example, human, physical, knowledge, capital resources and infrastructure, that are the fundamental resources and skills necessary for the emergence and development of a nation's competitive advantage. The identification of *factor endowment* (Porter, 1990, p. 74) in China is prodded by the introduction of the 'Five-Word principle': '*Small, Fast, Women, Water and Agile*' since the 1980s (Interview, a policy maker, previous department head of General Administration of Sport of China [GAS], May 15, 2013). Essentially, the adoption of this principle reflects not only the *skill* requirements (e.g. *fast* and *agile*) but also *physical* resources (e.g. *water* and *small*), which serves as a key criterion on which the government selected its competitive advantage sports/disciplines, and consequently established substantial policy and offered abundant financial support.

In specific terms, *Small* means small balls (table tennis and badminton) and categories (most notably men's 56kg and 62kg weightlifting); *Fast* emphasises the speed requirements for particular sets of sports and events; *Women* refers to the sports, disciplines and events that female athletes participate in; *Water* sports mainly include diving and the *119 Project*⁴; and

⁴ *119 Project*, initiated after Sydney 2000, was a project aiming at improving China's performance and competitiveness in athletics, swimming and other water sports including sailing, canoeing and rowing. There were 119 gold medals generated from these sports.

Agile stresses the tactical aspects of sports/disciplines, most notably artistic gymnastics and trampoline. This deliberate strategic prioritisation led by the Chinese government was a reconfiguration of elite sport landscape in China, which laid the foundations for China's subsequent rise on the Olympic stage.

Moreover, the Chinese government has placed significant emphasis on encouraging studies and research in analysing the setting, distribution, performance and configuration of elite sports in China. Tian's (1998) theory of clusters of sports and disciplines was a successful output of the government intervention, which was in circulation well before 1998 and provided the fundamental principle for China's categorisation and prioritisation of Olympic sports and disciplines later on. Hence, it serves as the prominent theoretical underpinning of the establishment of advantage sports and disciplines in China.

Tian (1998) summarised and introduced seven criteria for categorising Olympic sports/disciplines, ranging from dominant factors, action composition requirements, to the number of participants and so forth. Among them, the categorisations *as per dominant factors of sports and disciplines* (referring to, for example, primarily physical-based and primarily skill-based, etc., see Table 2), *action composition requirements* (referring to, for example, singular action, multiple action, multiple sport/discipline or event combined, etc., see Table 2), *result assessing methods* (referring to, for example, measuring, judging, target hitting, subduing, and scoring, etc., see Table 2) and their interrelationship (see Table 3) were further elaborated by Tian (1998, pp. 9-15). In particular, *the categorisation as per the dominant factors of the sports and disciplines* has been most influential in shaping China's elite sport structure, which clarifies the similarities and differences between different Olympic sports and reveals the main factors determining the success in different sports.

Table 2. Tian's (1998) categorisation of Olympic sports/disciplines.

Categorisation of Olympic sports/disciplines as per dominant factors	Sub-Category		Sport (Summer Olympics only)
1. Primarily Physical-Based	Explosive power		Field sports, weightlifting
	Speed		Sprint, short-distance swimming, short-distance track cycling
	Endurance		Distance running, race walk, rowing, distance cycling, distance and open water swimming
2. Primarily Skill-Based	Performance	Accuracy	Shooting, archery
		Difficult and Artistic (Judge sports)	Artistic gymnastics, trampoline, diving, synchronised swimming, rhythmic gymnastics
	Direct competition	Net	Volleyball, beach volleyball, table tennis, badminton, tennis
		Non-Net (Same-Arena)	Football, basketball, hockey, handball, water polo
		Combat	Fencing, judo, boxing, wrestling, taekwondo
Categorisation of Olympic sports/disciplines as per action composition requirements	Sub-Category		Sports, Disciplines and Events
1. Singular Action	Non-Periodical		Discus, shot put, hammer throw, weightlifting, ski jumping
	Periodical		Running, race walk, swimming, cycling, shooting, archery, long-distance skiing, speed skating, canoeing
	Combined		High jump, long jump, javelin throw, triple jump, pole vault

2. Multiple Action	Fixed	Artistic gymnastics (non-combined events), rhythmic gymnastics (non-combined events), figure skating, equestrian (dressage), slalom skiing, freestyle skiing
	Varied	Basketball, handball, football, water polo, hockey, ice hockey, table tennis, badminton, tennis, volleyball, boxing, wrestling, judo
3. Multiple Sport/Discipline or Event Combined	Same Sport/Discipline Multiple Event	Decathlon and heptathlon (track and field), speed skating (combined), artistic gymnastics (combined), rhythmic gymnastics (combined)
	Different Sport/Discipline	Modern pentathlon, biathlon, triathlon
Categorisation of Olympic sports/disciplines as per result assessing methods	Sub-Category	Sports, Disciplines and Events
Measuring		Athletics, swimming, speed skating, skiing, cycling, canoeing, weightlifting, archery, shooting
Target Hitting	Non-defence	Archery, shooting
	Defence	Basketball, handball, football, water polo, hockey, ice hockey, fencing
		Wrestling, judo, boxing
Judging		Artistic gymnastics, rhythmic gymnastics, diving, figure skating, synchronised swimming, equestrian
Subduing		Wrestling, judo, boxing
Scoring		Table tennis, badminton, tennis, volleyball

Source: Adapted from Tian (1998, pp. 11-13).

The implementation of clustering, in the context of China's elite sport development, can be summarised as the following five dimensions (Tian & Liu, 2012). First, strategically, the clustering of the Olympic market makes it possible for sports policy makers in China to make a more informed and scientific decision in effective positioning (Ries & Trout, 2001) and market specialisation (Abell, 1980). Second, at the macro-level management, the establishment of the clusters effectively contributes to orderliness, in a sense that sports/disciplines under the same sub-clusters are often grouped together and governed by the same management centre, for instance, Sports Management Centre for Badminton and Table Tennis, Sports Management Centre for Artistic Gymnastics and Trampoline (see Figure 1 for more examples). Third, following Tian's research, a considerable amount of literature has been published on training and coaching innovation for particular clusters and sub-clusters, including Yuan's (2013) study on synthesising offence and attack tactics for the sub-cluster of *non-net competition*, Song, Rao and Tian's (1990) investigation of the implications of the change of rules on tactic and techniques development for the sub-cluster of *net competition* and Zhang's (1990) work on young female athletes' psychological development and issues for the sub-cluster of *difficult and artistic*. They provided cluster-specific theoretical and practical guidance for the training of athletes of varying clusters. Fourth, Tian's cluster theory enhances the mobilisation of elite athletes and coaches. The most notable examples include the selection of the first Chinese National Handball Team squad from the National Basketball Team (Tian & Liu, 2012) and an Olympic cycling silver medallist's prior experience of being engaged in athletics, which is also evident in many other nations' sports systems (Interview, a current senior official of the National Cycling and Fencing Management Centre and previous coach of the National Cycling Team, May 16, 2013). Last, as a result of human resource mobilisation and management integration, exchanging, developing and innovating training techniques and coaching theories within clusters and sub-clusters are more likely to occur. For instance, the 'multiple balls' training method in table tennis was promoted to badminton and volleyball.

Table 3. The interrelationship between Tian's (1998) three types of categorisation of Olympic sports/disciplines.

Criterion	Dominant factors		Action structure	Result assessing methods
Clustering	Primarily physical-based	Explosive power	Singular action periodical and Non-periodical	Measuring
		Speed	Singular action periodical	Measuring
		Endurance	Singular action periodical	Measuring
	Primarily skill-based	Accuracy (Performance)	Singular action periodical	Measuring
		Difficult and artistic (Judge sports) (Performance)	Multiple action fixed	Judging
		Net (Direct competition)	Multiple action varied	Target hitting
		Non-Net (Same-Arena) (Direct competition)	Multiple action varied	Scoring
		Combat (Direct competition)	Multiple action varied	Subduing and target hitting

Source: Tian (1998, p. 15).

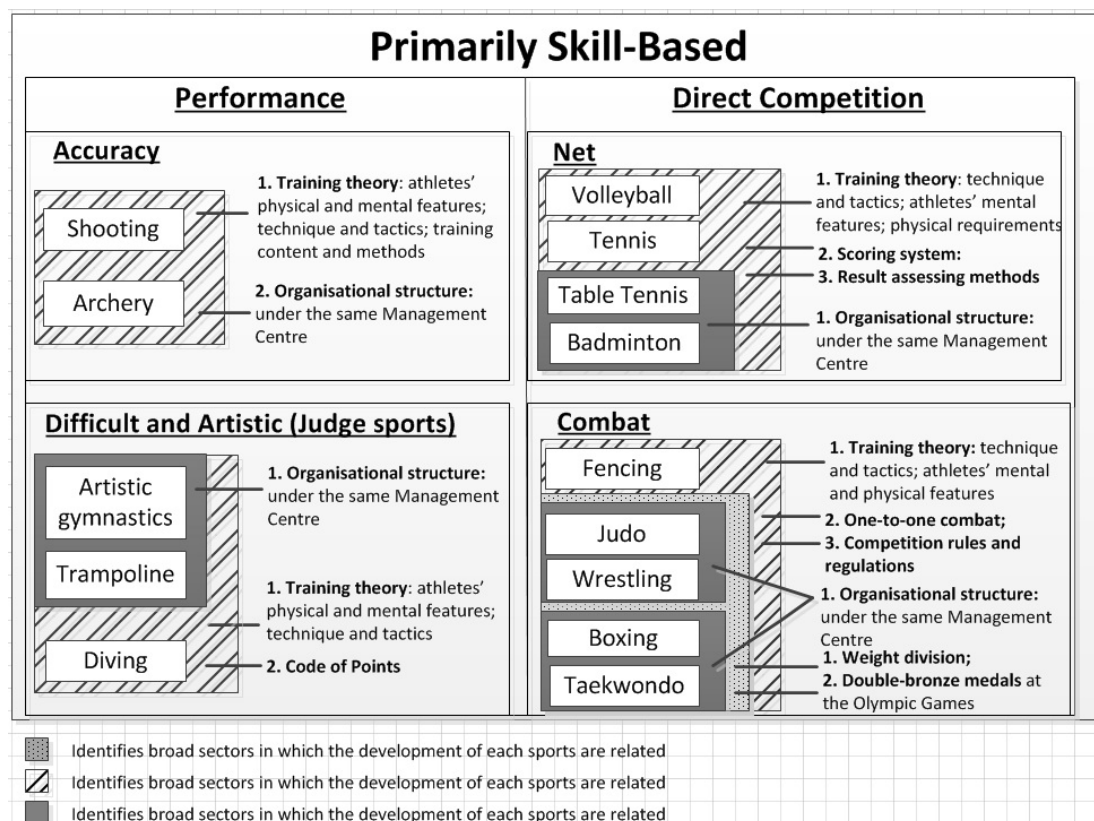


Figure 1. Inter-sub-cluster interchange: Some of the important links within and between clusters.

Research methods

To investigate why China has become dominantly successful in distinct sports and segments, two methods are employed to obtain the data. First, seven semi-structured interviews were conducted with key internal stakeholders (including previous and current political leaders, officials, coaches and judges working in both General Administrations and sport-specific management centres of GAS) of the realm of elite sport in China. Interviews were carried out in 2013, as part of a wider study which was focused on a comparative analysis of sport policy process between China and the UK. Interviewees were identified as per their seniority and availability, and comprised officials at both general and sport-specific levels, coaches, judges and the most renowned sports scholars in China (see Table 4). Interviews ranged in duration from 50 min to 2 h. A semi-structured interview approach was applied with a set of questions covering a wide range of policy areas of elite sport

development in China, and informal probing to facilitate a discussion of deliberate categorisation, clustering, positioning and targeting. The interviews were recorded digitally and conducted in Chinese by the author. A copy of transcripts in Chinese was provided to each interviewee for the purposes of verifying accuracy and correcting errors. To ensure the quality of translation, a process of back translation was carried out to detect and correct the linguistic inconsistencies before they were subjected to formal coding and analysis.

Table 4. Profiles of the interviewees.

Interviewee Number	Organisation(s)	Position (s)	Interview Date
1	Beijing Sport University	Professor of Sport Studies, The Editor of the Chinese Version of Olympic Encyclopaedia, one of the most renowned sports researchers in China	08/05/2013
2	FIG, The National Gymnastics Management Centre	A former international judge of FIG and previous official of the Management Centre (retired)	11/05/2013
3	GAS, China Institute of Sport Science (CISS), The National Basketball Management Centre and Chinese Basketball Association (CBA)	A previous senior official of GAS and former director of CISS, former director of the National Basketball Management Centre and the vice director of CBA (retired)	15/05/2013
4	The National Cycling and Fencing Management Centre and the National Cycling Team	Former head coach of the National Cycling Team and a current official of the National Cycling and Fencing	16/05/2013

		Management Centre	
5	The National Aquatics Management Centre and the National Swimming Team	Team leader of the National Swimming Team	22/05/2013
6	Beijing Sport University and the National Swimming Team	A swimming coach at Beijing Sport University and a coach of the National Swimming Team	27/05/2013
7	China Sports Culture Development Centre of GAS, China Sports Museum and China Olympic Museum	Former Director of China Sports Culture Development Centre of GAS, China Sports Museum and China Olympic Museum (retired)	03/06/2013

In order to strengthen the validity of the research and supplement the use of the interview, document analysis was adopted as the second method for this unit of analysis. The types of documents retrieved for this research range from books (mainly those official books published by GAS and renowned sports researchers in China), policy documents (most notably three versions of *Olympic Glory Plan, 1995, 2002, 2011*), official annual reports, to website information of GAS, sports management centres, National Sports Associations (NSAs), provincial sports governing bodies and Chinese Olympic Committee, influential domestic media such as Xinhua News Agency, China Central Television, People's Daily, Ifeng, People.com.cn, Titan, China.com.cn, ChinaNews and so forth (including both online and printed information). Publications (books and journal articles) by scholars specialising in sport development in China, in particular, China's elite sport system and Olympic strategy (such as Fan Hong, Dong Jinxia, Simon Shibli and Jerry Bingham and Susan Brownell) and the evolution of China's advantage sports and disciplines (such as Gu Chunyu, Yu Yin and Gao Ping) also formed an important source of data. Key books and documents published by various

departments of GAS and renowned sports researchers in China in relation to elite sport that were subjected to analysis in this article were as follows: China Institute of Sport Science (2008), General Administration of Sport of China (GAS, 2002, 2008, 2009, 2011), Liang, Bao and Zhang (2006), Policy and Laws and Regulations Department of General Administration of Sport of China (2010, 2011), Sports Ministry of China (1995), Tian (1998), Xu (2008) and Yang (2012) (see Appendix 1).

While a thematic content analysis was applied for the qualitative data, data relating to Olympic performance was subjected to statistical analysis. Specifically, both qualitative and quantitative analyses served to identify (1) the specific sports/disciplines in which China has been successfully gaining Olympic medals and (2) the history and changes of the Olympic results in these identified sports to discern the dynamic process by which competitive advantage was created and sustained.

One issue that needs clarifying is the distinction between sports and disciplines, which are often used interchangeably in media and some literature. Based on the comparison between the identifications of the International Olympic Committee (IOC, 2014) (28 sports and 41 disciplines), Sports-Reference (SR, 2014) (34 disciplines) and Shibli, Bingham, and Henry (2007, p. 76) (28 sports and 35 disciplines), 35 sports/disciplines have been identified for this paper (see Table 5). It is noteworthy that due to the differing dominant factors⁵, canoeing sprint and canoeing slalom are treated separately in this paper.

⁵ According to Tian's (1998) categorisation of sports, canoeing sprint belongs to the category of primarily physical-based sports while canoeing slalom is more skill-based.

Table 5. The identification of Olympic sports/disciplines during the period 1992-2012 (alphabetically).

Sports/Discipline
1. Archery; 2. Artistic Gymnastics; 3. Athletics; 4. Badminton; 5. Baseball; 6. Basketball; 7. Beach Volleyball; 8. Boxing; 9. Canoeing Slalom; 10. Canoeing Sprint; 11. Cycling; 12. Diving; 13. Equestrian; 14. Fencing; 15. Football; 16. Handball; 17. Hockey; 18. Judo; 19. Modern Pentathlon; 20. Rhythmic Gymnastics; 21. Rowing; 22. Sailing; 23. Shooting; 24. Softball; 25. Swimming; 26. Synchronised Swimming; 27. Table Tennis; 28. Taekwondo; 29. Tennis; 30. Trampoline; 31. Triathlon; 32. Volleyball; 33. Water Polo; 34. Weightlifting; 35. Wrestling

Sources: Adapted from IOC (2014) and SR (2014).

The evidence of deliberate adoption of the clustering theory

China has been in the top three of the medal tables for the four most recent Summer Olympics. Olympic success was established as an explicit and highly touted national priority since 1984. For China, its national advantage at the Olympics has come to reside in particular sports/disciplines, not in entire sectors. As early as in the 1960s, the agenda of developing a 'priority' list of sports first was highlighted in the policy of 'shortening the battle line and emphasising the focus' (Gu & Li, 2015, p. 123). It was evidenced from both the *Olympic Strategy* and interview data (Interview, a policy maker, previous department head of GAS, May 15, 2013) that, due to the limited resources and economic capacity in the 1980s, the government considered that it would be more realistic to concentrate the resources on a limited range of sports/disciplines to maximise the possibility of Olympic (gold) medal success. As a result, 'low investment and prompt return' individual sports/disciplines were prioritised while collective ball sports suffered strategic reform and 'cutting down'. A small number of sports/disciplines were prioritised to achieve greater Olympic medal success. Substantial investments in 'priority' sports and disciplines, the legitimacy of Olympic sports, and the prioritisation of Olympic success have been important stimuli to China's elite sport development (Interview, a sports researcher in China, May 8, 2013; Interview, previous department head of GAS, June 3, 2013).

The proclivity of the Chinese government to intervene directly in selecting 'prioritised' sports/disciplines was predicated on a careful scrutiny of both endogenous and exogenous factors. Endogenously, the priority position for the vast majority of 'fortress' sports/disciplines was entrenched by China's longstanding traditions and world leading performance in them. These sports and disciplines were developed soon after the establishment of the People's Republic of China and have long been popular among the public. In practical terms, they were assumed to be physically suitable for Chinese athletes and the incremental progress further convinced the policy makers of their compatibility with China and hence consolidating their priority positions (Interview, a policy maker, previous department head of GAS, May 15, 2013). External environment and sport-, discipline- and event-specific configuration were additional factors considered in identifying priority sports and refining China's elite sport structure. For example, most of China's advantages come from less globally popular sports/disciplines the international competition of which is less intense.

While the process of prioritising certain Olympic sports/disciplines was carried out at the strategic level, the formation of clusters based on Tian's training theory brought the prioritisation to the sport/discipline level. Figure 1 illustrates how sports/disciplines under each cluster are connected. Some of the most important links among clusters are illustrated by the shading. For example, shooting is linked to archery in two ways: first, as per Tian's (1998) training theory, the physical requirements and mental features of the athletes for these two particular sports are very similar. These two sports also have common basic training techniques and tactical game plans. Shooting and archery also cooperate on technological development. Second, in terms of organisational structure, both shooting and archery are governed by the Shooting and Archery Management Centre, which implies, for instance, that the manner in which the tasks are broken down and allocated to staff, the coordinating and controlling mechanism used, and the context in which these sports operate have a reasonable degree of resemblance and overlap. In the cases of artistic gymnastics, diving and trampoline, there are examples of talent transfer from one to another or from a similar discipline of acrobatic gymnastics. For

example, the former head coach of Chinese National Women's Artistic Gymnastics Team - Shanzhen Lu, was a former acrobat athlete and the Olympic diving champion Na Li had been specialised in acrobat training before the age of nine.

Taking the *primarily skill-based* cluster as an example, the operation of such cluster was encouraged by an array of criteria – one of which is closely associated with the skill factor *agile*. China possesses a large pool of a particular type of athletes (i.e. the *human resources* factor) who are physically suitable to compete in those sports (in particular for male athletes) (Interview, a former international judge of FIG and previous official of the National Gymnastics Management Centre, 11 May 2013; Interview, a policy maker, previous department head of GAS, 15 May 2013). In addition, such a cluster is also a striking feature at the provincial level. Following their tradition in and local people's physical compatibility (mainly physical stature and composition), provinces such as Hunan, Hubei and Sichuan have long deliberately prioritised artistic gymnastics and diving to a strategic level in preparation for the National Games of China (J. Li, 2009, p. 309; S. Li, 2009, p. 330; Zhu, 2015, p. 412). The deliberate prioritisation of sports and disciplines, following certain criteria including some explicit slogans and principles, is prevalent across a wide range of provinces, municipalities and autonomous regions (e.g. 'water, agile, small and heavy' for Hubei). Hence, there is a high degree of policy-level consistency of sports specialisation and prioritisation between provincial teams and National Teams. An effective leverage of the National Games provides provincial teams with enormous motives to invest in elite sport and hence benefits the National Teams by virtue of the contribution of athletes, coaches and many innovative approaches developed from provincial teams.

China's clustering and prioritisation of Olympic sports/disciplines is not confined to the sport/discipline level. In many cases, it is as detailed as event-specific especially where China does not have the capacity to establish advantage across a wide range of events of a sport or discipline. This is a deliberate government policy evident in *The Outline of the Strategic Olympic*

Glory Plan (General Administration of Sport of China [GAS], 2002) according to which GAS deliberately prioritised a certain cluster of events in athletics and swimming which is suitable for the development and has a relatively good mass foundation for breakthrough at Beijing 2008, instead of a wide range of events in a sport. Notable examples include Chinese female gymnasts' longstanding leading position in women's uneven bars and balanced beam, the targeting of race walk and women's 'throwing' events within the sport of track and field, the prioritisation and notable medal breakthrough in women's short-distance track cycling events, the tradition in women's one-person sailing (including windsurfing) events and so forth. In fact, a similar search for and defence of event-specific 'niche market' could also be illustrated by reference to many South-East Asian Nations' increasingly evident competitiveness in men's lightweight events in many heavy sports (e.g. Indonesia and Vietnam's notable competitiveness in men's lightweight weightlifting and Thailand's continuous winning of a gold medal in men's below-middleweight boxing at each Olympic Games between 1996 and 2008 and a silver medal in these events in London 2012), Kazakhstan's 'hegemony' in men's 69kg boxing, Iran's dominance in men's superheavyweight weightlifting and Hong Kong's reasonable degree of competitiveness in women's windsurfing including its Olympic gold medal breakthrough. All these examples provide useful experience regarding the direction of niche market identification for many non-major sports nations whose resources are not sufficient to support a whole sport or discipline.

However, one cluster development inevitably led to a thinning of some clusters (Porter, 1990). The development of primarily skill-based cluster had a significant bias towards *individual* sports, disciplines and events and hence, for example, *collective* and *primarily physical-based* sports/disciplines were underdeveloped. As a retired senior official of GAS and the former Director of the Basketball Management Centre recalled,

In order to carry out the *Olympic Strategy* and effectively enhance China's gold medal performance at the Olympic Games, a number of 'high investment but slow return' sports/disciplines were strategically 'cut

down' by the then Sports Ministry. This was a structural reconfiguration of elite sport landscape in China. Three 'big balls' - football, basketball and volleyball, were the main objects of 'cutting down'. The rationale was that these three sports required very heavy investment, cost much money, but had very limited number of gold medals and medals and took a very long time to bear visible fruit. Instead, focus was given to 'small, fast, women, water and agile' sports/disciplines. It is noteworthy that there were official policy documents of the reconfiguration and prioritisation based on which three 'big balls' most notably football and basketball suffered financial cut, scale cutting down and even the disbanding of football and basketball teams in many provinces, municipalities and autonomous regions ...

(Interview, May 15, 2013)

The concept of transferability (Porter, 1990) was also employed when China sought a breakthrough in new markets, differing to the existing advantage sports/disciplines. Here, the interchange within clusters bolstered competitive advantage (Porter, 1990) through the exchange and flow of information about techniques and technology, which is evidenced in China's notable progress in trampoline and synchronised swimming (the same *difficult and artistic* or *judge* subcategory as diving and artistic gymnastics) and similarly in women's tennis (the same *net* subcategory as table tennis and badminton). The effective interchange within a particular subcategory of Tian's clustering theory is a potent sorcerer's stone of new competitive advantage sports.

One of the most significant advantages of Tian Maijiu's theory of clusters of sports/disciplines was that similar sports/disciplines could exchange experience and learn the lessons from each other. For example, diving and artistic gymnastics, as two difficult and artistic disciplines, have much in common in relation to training methods and routine innovation and their successful experience has been promoted to synchronised swimming, in which China has made notable progress and become a frequent recipient of medals in major international competitions. More importantly, decision makers of GAS were more convinced of the potential of success and breakthrough in these sports/disciplines which are akin to China's fortress

sports. Consequently, these sports were more likely to be listed as important sports and therefore obtain policy and financial support.

(Interview, an official of GAS and team leader of the Chinese National Swimming Team, May 22, 2013)

The impact of the deliberate establishment and development of competitive advantage on China's Olympic performance

Clustering

The outputs of the establishment of clusters have been fruitful. As can be seen from Table 6, China has won a total of 201 gold medals in 20 sports/disciplines and 473 medals in 30 sports/disciplines (except for water polo, canoeing slalom, baseball, equestrian and triathlon) at the Summer Olympic Games so far. Among the 20 sports/disciplines that have contributed gold medals, six contributed 74.1% of gold medals and 63.9% of medals to China on the Summer Olympic stage. They are diving, weightlifting, artistic gymnastics, table tennis, shooting and badminton, five out of which belong to *primarily skill-based* category, with the only exception of weightlifting which belongs to the *explosive power* subcategory. In other words, Tian's (1998) research on theories of training has had a clearly discernible impact on China's Olympic (gold) medal strategy; and China relies overwhelmingly on *primarily skill-based* sports/disciplines for Olympic gold medals and medals: accounting for 75% and 70% of all gold medals and medals that China has won (see Table 6).

Table 6. A summary of the contribution of each category and subcategory of Summer Olympic sports/disciplines.

Sport/Discipline		Gold	Silver	Bro nze	Total	Gold Medal Proport ion	Medal Proportio n
Primarily Physical-Based (including weightlifting, swimming, athletics, canoeing sprint, rowing and cycling)		50	40	33	123	24.8%	26.0%
Primarily Skill-Based	Accuracy (including shooting and archery)	22	19	17	58	10.9%	12.3%
	Difficult and Artistic (including diving, artistic gymnastics, trampoline, synchronised swimming and rhythmic gymnastics)	62	38	30	130	30.8%	27.5%
	Net Competition (including table tennis, badminton, volleyball, tennis and beach volleyball)	43	25	26	94	21.4%	19.9%
	Non-Net Competition (including basketball, hockey, football and handball)	0	3	2	5	0.0%	1.1%
	Combat (including judo, taekwondo, fencing, boxing and wrestling)	22	15	19	56	10.9%	11.8%
	Total	149	100	94	343	74.1%	72.5%
Others (sailing, softball and modern pentathlon)		2	4	1	7	1.0%	1.5%
Total		201	144	128	473		

As Table 6 further elaborated, all subcategories of the *primarily skill-based* category except for *non-net* sports/disciplines have each contributed substantial gold medals to China. In particular, *difficult and artistic* (i.e. judge

sports/disciplines) and *net competition* sports/disciplines form the largest sources of gold medals and medals. Combined, *primarily skill-based* cluster has contributed almost three quarters of gold medals and more than 70% of medals to China, which demonstrated China's high degree of reliance on the *primarily skill-based* cluster. As mentioned above, China's huge success in the *primarily skill-based* sports/disciplines at the Olympics was partly because they were among the earliest to be prioritised by the Sports Ministry of China, and are still receiving heavy investment from GAS. More importantly, a nation's endowment of factors clearly plays a critical role in establishing competitive advantage of China's overall performance at the Olympics here.

Five-word principle

The results of the application of the 'Five-Word principle' have also been significant. For example, in relation to *women*, as can be seen from Table 7, China has been the second most successful nation in all women's events at the Summer Olympic Games between Barcelona 1992 and London 2012 (due to the boycotts, China's overall performance at the Olympic Games prior to that was not considered). In comparison, Chinese male athletes rank third in the gold medal table for male athletes over the same period while China lags behind the USA and Russia by a big margin (see Table 7). Horizontal comparisons further demonstrate China's reliance on female athletes, despite Chinese male athletes' high degree of competitiveness in many sports and disciplines. Chinese female athletes have won 112.5 gold medals and 271 medals, accounting for more than 55% of all gold medals and medals that China has won. However, it is noteworthy that the 'women outperform men' phenomenon was gradually established since Seoul 1988 while male athletes' gold medal and medal contributions were more significant than female counterparts at Los Angeles 1984 (see Figure 2).

Table 7. A summary of countries' gold medal table (female and male athletes respectively), taking the six most recent Summer Olympic Games together.

N o.	Female Athletes					Male Athletes				
	Country	Gold	Silver	Bronze	Total	Country	Gold	Silver	Bronze	Total
1	USA	105.75	83	91.6	280.35	USA	129.25	114	93.4	336.65
2	China	104.5	77.5	64	246	Russia (Including Unified Team)	113	78	112	303
3	Russia (including Unified Team)	65	82	59	206	China	76.5	47.5	43	167
4	Germany	39.35	45	49	133.35	Germany	66.65	56	81	203.65
5	Australia	30.75	40.6	45	116.35	UK	49.3	41.1	41.7	132.1
6	Romania	28	21	19	68	France	43	41	55	139
7	South Korea	27	19.5	19	65.5	Australia	39.25	49.4	52	140.65
8	UK	24.7	18.9	29.3	72.9	Cuba	39	29	37	105
9	Japan	22	25	28	75	Italy	38	35	47	120
10	France	22	21	30	73	South Korea	35	40.5	32	107.5

Note: There are mixed events in a number of sports and disciplines including equestrian, badminton, tennis and previously shooting.

There are several main contributory factors behind Chinese women's elite sport success. First, China's emphasis on both male and female sports as early as in the 1950s (Brownell, 2005, p. 1184) provided a solid foundation for an early development of many female sports, disciplines and events (Dong, 1998, p. 208). Second, China's longstanding high degree of competitiveness in many female sports in the world (e.g. in table tennis, diving, shooting and artistic gymnastics since the 1980s and many collective sports since the

1980s and 1990s and even earlier most notably women's volleyball and to a lesser extent women's handball, basketball and football) provided the decision makers with a 'natural' area to prioritise. Third, China has taken advantage of the nature of relatively lower degree of international competition in many female sports due to the relatively lower degree of popularity in comparison to male counterparts and the relatively later development of many female sports on a global scale, to strategically support certain female sports in a prompt manner and achieved international success instantly. This was more evident in the increasing number of female sports, disciplines and events added to the Olympic Games (e.g. women's football and women's softball in 1996, women's weightlifting in 2000, women's wrestling in 2004, bicycle motocross (BMX) and open water swimming in 2008 and women's boxing in 2012), which, in a way, prompted China to react and subsequently to concentrate its resources on developing an advantage in women sports. Fourth, the targeting of new, including many women's collective and ball Olympic sports, disciplines and events was a deliberate strategy highlighted as early as the mid-1990 in *The Outline of the Strategic Olympic Glory Plan: 1994-2000* (Sports Ministry of China, 1995). China invested early and achieved notable competitiveness in women's heavy sports, ranging from women's judo, women's weightlifting and women's wrestling to most recently developed women's boxing, as well as Olympic medal performance in the vast majority of women's collective ball sports and disciplines.

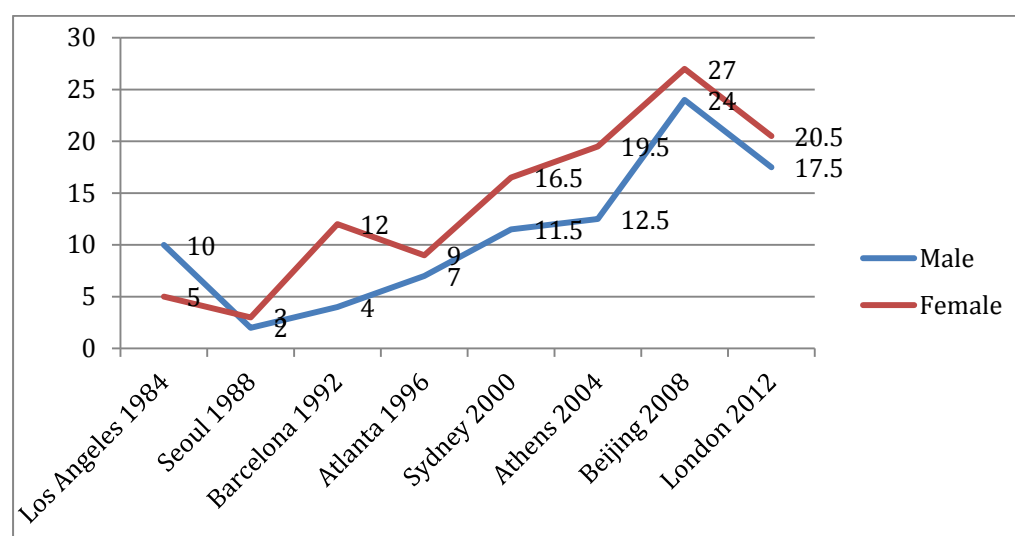


Figure 2. The number of gold medals won by Chinese male and female athletes from Los Angeles 1984 to London 2012.

Sustaining advantage

China's longstanding dominance in, for example diving and table tennis, is a remarkable story of competitive advantage sustained for more than 30 years, which, as summarised above, was an impact of strategic planning and skilled personnel. However, as the Olympic industry matures and evolves, China's leading position in certain sports/disciplines is challenged. This is a result of a) the decline in some traditional sports since London 2012 (such as shooting, weightlifting and artistic gymnastics) due to the increasingly intense competition with other nations; b) the 'saturation' or the 'limit' of the number of gold medals in some key sports most notably table tennis, badminton and to a lesser extent diving; c) a series of measures taken by the International Federations which aimed to erode China's dominance (such as the decrease in the number of athletes from the same nation allowed to compete in the singles events in table tennis at the Olympic Games by the International Table Tennis Federation and the encouragement of individual non-combined events rather than team or individual all-round events in artistic gymnastics by Fédération Internationale de Gymnastique); and d) the political leaders' ambition and the public's expectation to raise the quality of Olympic gold medals.

Faced with this external challenge, there was a tendency for the developed advantage to begin to unravel thus China started to look into future sustainability. At the national level, the role of government in sustaining national advantage is significant through providing an environment in which not only the established advantage sports/disciplines can be sustained but also new, or missing, advantage sports/disciplines can be supported. The central goal of the Chinese government's policy towards elite sport is to achieve a breakthrough in gold medal-abundant and internationally influential sports/disciplines, including foundation sports/disciplines of athletics, swimming, rowing, canoeing and sailing and collective ball sports most notably football, basketball and volleyball (*The Outline of the Strategic Olympic Glory Plan: 2001-2010*, GAS, 2002). More recently, the issue of *The*

Outline of the Strategic Olympic Glory Plan: 2011-2020 clearly outlines a more detailed plan as to how to maximise its position in *advantage sports/disciplines*, and how to further develop *potential advantage* and *lagging sports/disciplines*. This is a big step forward, signalling China's readiness to 'invade' a wide range of non-traditional sports/disciplines (General Administration of Sport of China [GAS], 2002, 2011), echoing Houlihan and Zheng's (2013, p. 346) adoption of the marketing metaphor of spreading risk across a wide portfolio of investments.

China's approaches to sustaining its advantage at the Olympics reflect what Porter suggested that advantage can be sustained if its sources are 'widened' and 'upgraded' (1990, p. 147). In terms of 'widening', there are two types of expansions: seeking new competitive advantage within the same sport/discipline in which China has already established advantage on the world stage, and transferring advantages and competitiveness to 'non-fortress' sports/disciplines. China has deliberately targeted *similar* events, by providing more substantial financial and coaching support to a wider range of events in many potential advantage sports. For example, due to the removal of China's previously only advantage in cycling - women's 500m time trial after Athens 2004, Chinese National Cycling Team was 'forced' to target women's individual sprint for Beijing 2008, and the women's team sprint and the women's keirin for London 2012. The time trial cyclists were transformed into 'experts' of the sprint and keirin events and many training methods previously serving the time trial event were applied to sprint and keirin. China achieved greater medal success at the Olympic Games and established a reasonable degree of group advantage in women's short-distance track events. The deliberate support for women's team sprint and women's keirin also demonstrated the aforementioned China's longstanding tradition of deliberately targeting new Olympic especially women's sports, disciplines and events.

In addition, China has also targeted non-advantage events within the same sport/discipline, which are largely different from the existing advantage events. For example, China's medal breakthrough in epee and sabre in the

2000s significantly enriched the sources of medals for the Chinese Fencing Team, the Olympic medal success of which had been traditionally confined to foil. Key steps including the extra inputs of human resources (in particular the recruitment of leading French sabre and epee coaches) and finance from the government contributed to China's gold medal breakthrough in epee and sabre in 2012 and 2008 respectively. A more recent example was China's deliberate strategy to improve the heavyweight events in men's weightlifting, as a response to the 'threat' posed by nations most notably North Korea in lightweight events since London 2012, China's traditional 'fortresses'. The decline in these events consolidated GAS and the weightlifting officials' determination to take concrete steps to promote the heavyweight events (China Central Television (CCTV), 2013), which had been a rhetorical ambition previously. A key approach was the heavy investment in the mastery of the regularities of heavyweight events, the optimisation of training methods and the improvement of skill level (ChinaNews., 2011). The impact of such strategy was positive, evidenced in China's notable progress in men's 94 and 105kg in recent continental and international competitions (Ifeng, 2014).

In terms of 'upgrading' (Porter, 1990), innovation occupies a key position when some of China's core competences deteriorate. The most notable example is the Chinese Artistic Gymnastics Team, which successfully recovered from the poorest gold medal performance ever (with only one gold medal and two bronze medals) at Athens 2004 and superseded Russia and Romania as the top artistic gymnastics nation especially in male artistic gymnastics. There is a general consensus that the prompt and ingenious mastery of and adaptation to the FIG's revolutionary adoption of the non-maximum scoring system was a key contributory factor (Interview, a sports researcher in China, May 8, 2013; Interview, a former international judge of FIG and previous official of the National Gymnastics Management Centre, May 11, 2013). This is also the fruit of the National Artistic Gymnastics' longstanding heavy emphasis on the rule-related issue (the mastery of FIG's new rules, the nationwide promotion of the new rules and the large-scale routine design activities inside the National Team conforming to the new rules) at the beginning of each Olympiad, the most important effect of which

were many innovative routines with high difficulty across a wide range of events (Interview, a former international judge of FIG and previous official of the National Gymnastics Management Centre, May 11, 2013). In fact, 'innovation' was a key concern in *The Outline of the Strategic Olympic Glory Plan: 2001-2010*, which identified 'the mastery of regularities and innovation' as a key measure and solution for elite sport in the new decade (General Administration of Sport of China [GAS], 2011). To promote the transformation of elite sport development from 'factor-driven' to 'innovation-driven' was a key policy objective identified in this fundamental policy document.

Conclusions and implications

This study attempts to address an important limitation in the vast literature on the structure of elite sport system, by examining more closely how China's elite sport system has been organised and structured. China's Olympic success was not established over one or two editions of the Olympics. It was a result of deliberate strategic planning and the development of competitive resources and environment around clusters of sports/disciplines since the 1980s. Strategic prioritisation, concentration and targeting of Olympic sports/disciplines based on China's competitiveness, medal potential and external competition are the dominant characteristics in this case.

However, China's Olympic strategy and the development of clusters are by no means static. As noted above, China has constantly fine-tuned its sports configuration system with the fundamental prioritisation of fortress sports/disciplines, in combination with the identification of new areas to target. There is a clear trajectory of the development of key principles and tasks across the three versions of *The Outline of the Strategic Olympic Glory Plan*. China's Olympic strategy has gradually evolved from 'shortening the battle line and emphasise the focus' prior to the 2000s, to 'seeking new sources of Olympic gold medals' in the 2000s and 'raising the quality and value of Olympic gold medals' after Beijing 2008 which targets more internationally popular, influential and high-profile sports/disciplines. This deliberate and

rational government-led approach has therefore effectively enhanced China's medal performance at the Olympic Games.

The organisation of China's elite sport was consequently shaped by its nationally strategic planning, which was illustrated by reference to the 'three-tiered' theory: *advantage, potential advantage and lagging* sports/disciplines (Liang et al., 2006, p. 56; Yang, 2012, p. 317). While there was more substantial financial and policy support from the government for advantage sports/disciplines, the degree of centralisation and organisational specialisation was higher in comparison with most potential advantage and lagging sports/disciplines. Thus the implication of the results supports Chandler's (2003) conception of the hierarchical relationship between structure and strategy - strategy precedes structure and the view that changes in strategy trigger changes in administrative structure is explicit in this study. It is undeniable that given the size and complexity of China's elite sport system, there is a reasonable degree of 'diversity' regarding day-to-day practices between different sports/disciplines within the same clusters and across different provinces. The high degree of autonomy evidenced in the prioritisation of sports/disciplines by different provinces as per their traditions and physical suitability is noted above, while the notable differences of the nature, political significance, and organisational structure of different sports/disciplines within the same cluster are evidenced in the detailed managerial approaches. For example, for a same sport but different disciplines, a centralised regime is only adopted for women's short-distance track cyclists who have won all China's Olympic medals in cycling, while women's middle- and long-distance track cyclists and male track cyclists only stay in the National Training Base in Beijing for a certain period of a year and spend most of their training time in their corresponding provincial teams (Interview, a current senior official of the National Cycling and Fencing Management Centre and previous coach of the National Cycling Team, May 16, 2013). Another example is related to the recruitment of foreign coaches for elite sport teams. While foreign coaches were almost found exclusively in China's non-fortress sports, the six 'fortress' sports/disciplines were largely self-reliant in coaching, within which, distinctively, the Women's Artistic

Gymnastics Team has maintained a cooperative relationship with a Romanian-born French coach who has been responsible for choreography design for women's floor exercise (Interview, a former international judge of FIG and previous official of the National Gymnastics Management Centre, May 11, 2013).

The theory of competitive advantage serves as an effective framework for this study, to guide the identification of the country sources of competitive advantage, as well as to synthesise our understanding on elite sports' competitive advantage development. The application of several key factors and mechanisms in the competitive advantage framework, for example, factor conditions, strategy and structure, the role of government, and clustering provides an interesting gateway to consider elite sport development from a business strategy perspective. In particular, the process of the emergence, development and sustaining of clusters is essential when competing in the 'Olympic market': starting from dividing the elite sports/disciplines into homogenous groups in order to concentrate resources on gaining a competitive advantage within the segment (Goyat, 2011), establishing a systematically planned domestic competition structure (in particular the National Games), awarding schemes, and a sophisticated talent selection system to transferring advantages developed in a well-established cluster to another in order to seek a breakthrough in less advantage sports/disciplines.

Such understanding of the operation of clustering approach would allow other nations such as Malaysia and Singapore which have invested heavily in Olympic preparation yet to achieve Olympic gold medal breakthrough, and nations such as India and Brazil which have clearly increased Olympic medal ambitions, to make a more informed strategic management decision with regard to Olympic medal targeting and elite sport's capability development. More precisely, understanding clusters requires adding the following four elements to the strategic agenda. First, examining one nation's *factor conditions*, *structure* and *global rivalry* to identify its prioritised sports/disciplines. With the establishment of policy priority and financial support, one or several clusters may begin to form. Second, developing

specialised elite sport infrastructure, for example, resources, specialised training, and research, to foster the development of domestic competition structure. As the elite system grows and concentrates around a few sports/disciplines, a pool of specialised athletes and technicians will be developed, including coaches, medical supporting staff, scientific specialists, volunteers and so forth. Third, developing sustainable competitive advantage through upgrading and widening the clusters of sports/disciplines. Fourth, working collectively: the way clusters operate requires collective action across sports/disciplines, including exchanging ideas, collecting cluster-related information, establishing collective training or research programmes, etc.

New developments of the application of the competitive advantage theory in the field of sport will require attention to a number of empirical questions, for example, identifying how each sport and discipline reacts to the development of national competitive advantage at the micro-level; investigating a wider range of conditions in a nation that may create an environment in which individual sport can attain international competitive advantage. Further empirical research should also seek to provide a better understanding of some of the core elements of the sub-clusters' interchange presented in Table 3.

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Appendix 1. Key books published by GAS and renowned sports researchers in China in relation to elite sport.

Book Number	Book Title	Author(s)/Organisation(s)	Publisher	Year
1	<i>Aoyun Zhengguang Jihua Gangyao (1994-2000)</i>	Sports Ministry of China	Beijing: Sports Ministry of China	1995

	<i>[The Outline of the Strategic Olympic Glory Plan: 1994-2000]</i>			
2	2001-2010 <i>Nian Aoyun Zhengguang Jihua Gangyao [The Outline of the Strategic Olympic Glory Plan: 2001-2010]</i>	General Administration of Sport of China	Beijing: General Administration of Sport of China	2002
3	2011-2020 <i>Nian Aoyun Zhengguang Jihua Gangyao [The Outline of the Strategic Olympic Glory Plan: 2011-2020]</i>	General Administration of Sport of China	Beijing: General Administration of Sport of China	2011
4	<i>Pinbo Licheng Huihuang Chengjiu: Xinzhongguo Tiyu Liushinian [A Hard-Fighting Journey and Brilliant Achievements: A Sixty-Year History of Sport in New China] - Three Volumes</i>	General Administration of Sport of China (Ed.)	Beijing: Renmin Chubanshe [People's Publishing House]	2009

5	<i>Gaige Kaifang Sanshinian de Zhongguo Tiyu [Chinese Sport in Thirty Years of Reform and Opening Up]</i>	General Administration of Sport of China (Ed.)	Beijing: Renmin Tiyu Chubanshe [People's Sports Publishing House of China]	2008
6	<i>Guojia Tiyu Zongju Tiyu Zhexue Shehui Kexue Yanjiu Chengguo Huibian (Jingji Tiyu Juan, 2001-2006) [A Collection of Achievement in Sports Philosophy and Scientific Research of General Administration of Sport of China (Elite Sport Volume, 2001-2006)]</i>	Policy and Laws and Regulations Department of General Administration of Sport of China (Ed.)	Beijing: Renmin Tiyu Chubanshe [People's Sports Publishing House of China]	2010
7	<i>Tiyu Shiye 'Shierwu' Guihua Wenjian Ziliao Huibian [A Collection of documents and Material regarding Sports Projects and</i>	Policy and Laws and Regulations Department of General Administration of Sport of China (Ed.)	Beijing: Renmin Tiyu Chubanshe [People's Sports Publishing House of China]	2011

	<i>Plans of China in the '12th Five Years']</i>			
8	<i>Juguo Tizhi [The Whole Country Support for Elite Sport System]</i>	Liang Xiaolong, Bao Mingxiao and Zhang Lin	Beijing: Renmin Tiyu Chubanshe [People's Sports Publishing House of China]	2006
9	<i>Woguo Aoyunhui Beizhan Cansai de Lilun yu Shijian [Theory and Practice of China's Olympic Preparation and Participation] - Two Volumes</i>	Yang Hua (Ed.)	Beijing: Zhongguo Fazhi Chubanshe [China Legal Publishing House]	2012
10	<i>Xiangqun Xunlian Lilun [Theories of Training Based on Clusters of Sports and Disciplines]</i>	Tian Maijiu (Ed.)	Beijing: Renmin Tiyu Chubanshe [People's Sports Publishing House of China]	1998
11	<i>Olympic Dreams: China and Sports 1895-2008</i>	Xu Guoqi	London and Cambridge, Mass: Harvard University Press	2008
12	<i>Tike Fenjin Wushinian</i>	China Institute of Sport Science (CISS) (Ed.)	Beijing: China Institute of	2008

	<i>[Fifty years of China Institute of Sport Science's Hard Work]</i>		Sport Science of General Administration of Sport of China	
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